

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)**ScienceDirect**Journal homepage: [www.elsevier.com/locate/cortex](http://www.elsevier.com/locate/cortex)**Single Case Report****Delusions in postpartum psychosis: Implications for cognitive theories**

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**ABSTRACT**

Postpartum psychosis is a rare but serious condition that can affect women after childbirth. We present a case study of an individual with no comorbidities or psychiatric history who developed postpartum psychosis characterised by prominent misidentification delusions whilst admitted to hospital. The woman recovered quickly with medication and showed no evidence of relapse over the following three years. Whilst still symptomatic and after recovery, the patient was able to provide a detailed description of her experiences. Contemporaneous interviews and observations during her hospital admission and a subsequent detailed retrospective account provide a unique, comprehensive window into her experience of these time-limited delusions. Her case reveals important insights including the triggers for her misidentification delusions, the role of social and contextual influences on delusional beliefs, and her recall of active involvement in evaluating and discarding delusional hypotheses. These insights highlight the complexity of delusional beliefs, challenge existing theories of delusions, and help inform broader theories of belief formation.

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**1. Introduction**

Delusions can be highly distressing and debilitating with impacts on everyday functioning, quality of life, and social relationships. They also pose fundamental questions for neuropsychiatry in terms of how such beliefs can arise, persist

and, in some cases, resolve, all despite incontrovertible contradictory evidence. Given such seeming illogicality, delusions have sometimes been viewed as being incomprehensible (Jaspers, 1910/1963) or distinct from ordinary belief (Feyaerts, Henriksen, et al., 2021). Research over recent decades, however, has indicated that delusions can develop from specific neuropsychological deficits or anomalies (Coltheart et al.,

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2011; Connors & Halligan, 2020). From this cognitive neuro-psychiatric perspective, delusions can be understood in terms of disruptions to the cognitive processes of normal belief formation (Connors & Halligan, 2015, 2020). Such an approach focuses on key symptoms, rather than broader psychiatric diagnoses, to relate specific pathological features to models of normal cognition (Halligan & David, 2001). The approach values single case studies given the heterogeneity of clinical symptoms, the rarity of certain presentations with theoretical significance, and the opportunity to interrogate symptoms in greater detail than in larger group studies (David, 1993; Marshall & Halligan, 1996). In this paper, we present a detailed study of a previously healthy individual who experienced postpartum psychosis and whose case provides unique insights into delusions.

### 1.1. Cognitive theories of delusions

Early explanatory accounts suggested that delusions are elicited from individuals' attempts to understand and explain anomalous perceptual experiences (Bell et al., 2006; James, 1890; Maher, 1974). A common example has been Capgras delusion, the belief that a familiar person had been replaced by a look-alike imposter (Edelstyn & Oyebode, 1999). Several patients with this delusion have shown a deficit in the autonomic processing of familiar faces (Ellis et al., 1997), an impairment that could plausibly generate the delusion's content (Ellis & Young, 1990). As a result, patients could encounter a known individual without their usual sense of familiarity, leading them to develop the belief that the individual had been replaced by a visually similar impostor. In a similar way, a range of other delusions have been associated with specific neuropsychological deficits related to their content (e.g., Breen et al., 2001; Connors & Coltheart, 2011; Halligan & Marshall, 1996; Vallar & Ronchi, 2009).

The underlying neuropsychological trigger for some delusions, however, remains uncertain and open to debate. This is evident in the case of Fregoli delusion, the belief that strangers are known people in disguise (Langdon et al., 2014; Teixeira-Dias et al., 2023). One account of this delusion holds that excessive autonomic responses could lead to an inappropriate sense of familiarity around strangers (Ramachandran & Blakeslee, 1998). An alternative account suggests that inappropriate activation of stored representations of known people (person identity nodes) could lead to unfamiliar people being misidentified as known people in disguise (Ellis & Young, 1990). These cognitive accounts differ in the level of processing thought to be affected, with potential implications for clinical interventions. Similar uncertainty is evident in Cotard delusion, the belief that one is dead (Edelstyn & Oyebode, 2006). Proposed explanations include dissociation (Enoch & Trethowan, 1979) and loss of autonomic responsiveness (Ramachandran & Blakeslee, 1998). Both involve some form of disconnection from the subject's somatic experience, though at different levels of cognitive processing, similarly with potential implications for future interventions.

Across delusions, a further issue is whether only a single factor – interpretation of anomalous sensory data – is solely involved and sufficient to generate and maintain a delusional

belief (McKay & Mercier, 2023). Single factor accounts have difficulty explaining why some patients with a similar deficit do not develop a delusion. There are, for example, patients with a deficit in autonomic responses to faces who do not develop Capgras delusion (Tranel et al., 1995) and patients with hyperfamiliarity to faces (Vuilleumier et al., 2003) who do not develop Fregoli delusion. To account for these non-delusional cases, some theorists have proposed a second contributing factor, a deficit in belief evaluation (Coltheart et al., 2011; Langdon & Coltheart, 2000). This latter deficit is posited by proponents to be common across all delusions and explain why delusions are maintained and not rejected. While influential, limitations of this approach include the lack of independent evidence for this second factor (Corlett, 2019); the potential for the observed dissociation between delusional and nondelusional cases to arise without a specific deficit in belief evaluation (Connors & Halligan, 2020); and questions about the theory's assumptions and applicability to the wide variety of delusions and delusion-like beliefs in the population (Connors & Halligan, 2020).

Recent developments have attempted to explain delusions in terms of a putative cognitive model of normal belief formation. Connors and Halligan (2015, 2020) proposed a tentative five-stage account. First, a precursor provides a distal trigger for a belief's content. This can take the form of an unexpected perceptual input, but it can also include communication from trusted sources or internal reflections on past experiences. Second, a search for meaning, instigated by the precursor, seeks to account for the unexplained precursor. This interpretative stage is heavily shaped by existing beliefs, memories, social information, contextual factors, and attributional biases, all of which provides the basis for a proto-belief. Third, this proto-belief is evaluated in terms of its adequacy at explaining the precursor and consistency with pre-existing beliefs. Fourth, a belief is generated with personal endorsement. Finally, the accepted belief begins to influence lower-level cognitive processes and other existing beliefs, providing the 'mental scaffolding' for appraising, explaining, and integrating new observations. As such, holding a new belief can influence the interpretation of further inputs, often in a way that supports and maintains the belief (Connors & Halligan, 2017; 2021a; 2021b, 2022). When applied to delusions, this five-stage framework has the advantage of better accounting for observed heterogeneity and the influence of pre-existing beliefs and social factors. As a general cognitive model, this framework, like one- and two-factor accounts, can be applied to understanding delusions across clinical conditions.

### 1.2. Postpartum psychosis

Postpartum psychosis is a rare condition that affects 1–2 per 1000 women after childbirth (VanderKruik et al., 2017). Around half of affected women have no previous psychiatric history (Bergink et al., 2016). Onset is typically 2–4 weeks after delivery and is characterised by marked mood disturbance, disorientation, delusions, and hallucinations (Kamperman et al., 2017; Klompenhouwer et al., 1995). Symptoms usually respond relatively quickly to treatment and a large proportion do not experience a recurrence (Gilden et al., 2020). The biological cause for postpartum psychosis is currently unknown,

but is thought to relate to hormonal changes (e.g., rapid estrogen and progesterone withdrawal postpartum), autoimmune factors, sleep deprivation, and stress associated with the birth (Bergink et al., 2016). The condition is highly distressing to patients and their families. The condition also carries serious risks of suicide and infanticide, so usually requires inpatient monitoring and treatment (Osborne, 2018; Sharma et al., 2022). Given these factors and its comparative rarity, the condition has been difficult to study.

In some occasional circumstances, however, the condition can offer a unique opportunity to study aspects of a short time-limited psychosis. Postpartum psychosis occurs in young women often without pre-existing medical or psychiatric conditions. As such, the condition provides a rare window of research opportunity where psychotic symptoms can be tracked from their outset without confounding variables that are often present in patients with more established long-term psychosis, such as cognitive impairments, negative symptoms, long-term medication exposure, functional decline, and socialisation to mental health care. The rapid onset and resolution of postpartum psychosis further permits an exceptional first-person perspective on symptoms. We report a case of an individual whose symptoms emerged during admission and who was later able to provide a detailed account of her experiences at follow-up. This combination of first and third person accounts both contemporaneously and retrospectively offers a unique insight into the genesis and remission of delusions.

## 2. Case report

### 2.1. Presentation

Natalie (pseudonym) was a woman in her early 30s who was married and lived with her husband and two young children. She worked as a senior manager in a large company. Fluent in English, she was originally from abroad and spoke several other languages. She had previously completed undergraduate and postgraduate degrees. Both children were born following uncomplicated pregnancies with normal deliveries. She had no history of any prior psychiatric or medical conditions; no history of drug use; no concerns after her first child's birth three years earlier; and no family history of psychiatric or medical conditions.

Natalie voluntarily presented to hospital by ambulance three weeks after the birth of her second child. At this point, she reported two weeks of worsening confusion, memory loss, and insomnia. She described, for example, not recalling details of what she had done during the day and difficulty following conversations. She also noted becoming very worried with her baby's weight and that she had been weighing him frequently on scales despite reassurance from a paediatrician. Natalie reported that her confusion had worsened approximately three days prior to hospital presentation, such that she had started to become disoriented and highly distressed when she did not recall where her children were. She likened her state to being "in a trance" and what she imagined it would be like to be on drugs, despite never having taken drugs in the past. Her husband corroborated her account and described Natalie as being uncharacteristically

forgetful and erratic. He noted that Natalie had been repeating herself frequently, forgetting recent conversations, asking nonsensical questions, misplacing belongings, and becoming preoccupied about certain topics, such as their baby's weight.

On initial review by her clinical team (including MHC, JG, and MML), Natalie appeared perplexed and highly stressed. She also showed evidence of mild thought disorder with circumlocution, tangentiality, and occasional derailment. Natalie reported thinking that something was wrong, but could not identify what this was, and accepted that she needed treatment based on the reactions she had received from those around her, including the clinical staff. She also reported being concerned that someone in her family was "crazy" and thought it might be her but wondered if it could be someone else instead. She denied auditory hallucinations and showed no evidence of delusions, depression, or mania.

Following initial review, Natalie was voluntarily admitted to a small, short-stay mental health ward and started on regular quetiapine, an antipsychotic medication (100 mg at night, increased to 200 mg the following day). She remained confused and frequently sought clarification about her presentation from staff, sometimes by providing written notes. She, for example, repeatedly checked the name of the hospital she was in and that staff had not mixed up the names of her family members. She also expressed possible paranoid ideation, asking several times if there were cameras in the bedrooms and if staff thought she was related to Hitler. After two days, Natalie was observed talking aloud to herself, which was taken as evidence of auditory hallucinations, though she denied experiencing hallucinations at the time. Natalie then became distressed believing that another patient was her mother-in-law in disguise (Fregoli delusion) and was intent to harm her. Natalie persistently identified this patient as her mother-in-law despite apparent physical differences and repeatedly attempted to abscond from the ward to escape her.

As a result of these attempts to abscond on her second day in hospital, Natalie was transferred to a general adult mental health ward that was larger and more secure. On this ward, Natalie identified another female patient as her mother-in-law and a male patient as her father-in-law. She said she could tell this by their behaviour and mannerisms. Natalie also became very suspicious of a close friend who visited her, such that it seemed that she thought her friend had been replaced by an impostor (Capgras delusion). In addition, Natalie became preoccupied about paedophilia and the safety of her children from unknown perpetrators. None of her delusions, however, directly related to her children or husband.

Natalie's delusions, confusion, and thought disorder gradually resolved while she continued to take regular quetiapine (dose gradually increased to 300 mg at night). After five days in the second ward, she was transferred back to the original ward, where she remained for a further four days. She had increasing amounts of leave from both wards with her friend and husband without incident. When visiting home on one occasion, Natalie reported ideas of reference – thinking a song on the radio was communicating a special message to her – and having some mild transient concerns about her friend's motives that she identified at the time as being part of her illness. She was eventually discharged home after a total of eleven days in hospital with a plan for a further admission

with her baby to a specialist perinatal mental health unit the following day.

## 2.2. Follow-up

After discharge, Natalie had a further two-week admission to a specialist perinatal mental health unit. Her treating team at this other hospital noted some mild thought disorder and possible mild residual ideas of reference on arrival. As a result, her quetiapine dose was increased (to 400 mg at night). These symptoms, however, resolved very rapidly and Natalie adapted quickly to caring for her baby without any difficulties.

After this discharge, Natalie had weekly follow-up with a perinatal mental health team (including JG and MHC) over the following six months. During this time, her medication was gradually weaned and ceased with no signs of recurrence.

## 2.3. Investigations

On first presentation to hospital, a physical exam and blood tests – including routine blood count, electrolytes, metabolic markers, renal and liver function, inflammatory markers, and detailed autoimmune panel – were normal. All other investigations were completed after her discharge from the perinatal mental health unit. Cognitive testing with the Addenbrooke's Cognitive Examination III (Hsieh et al., 2013) administered in English and an electroencephalogram, were normal (raw score for the former was 100%). Neuropsychological testing of face processing using the Cambridge Face Memory Test (Duchaine & Nakayama, 2006) was likewise normal (raw score 94%, well above the mean for normative controls; Bowles et al., 2009).

A magnetic resonance imaging (MRI) of her brain with intravenous gadolinium was normal except for a small lesion ( $6 \times 5.5 \times 6.5$  mm) in the left subcallosal region with slightly heterogeneous signal intensity on volumetric contrast enhanced FLAIR and T1 weighted sequences. Radiologists reported this as very likely being a small dysembryoplastic neuroepithelial tumor, a benign slow growing glioneuronal tumor. Repeat imaging over three years indicated that this lesion was unchanged. Independent experts considered the lesion to be an incidental finding given the fact that her symptoms were typical for postpartum psychosis and of short duration together with the absence of neurological symptoms or a recurrence.

## 3. Patient reflections

Natalie spoke openly about her experiences in the months after discharge during the follow-up period.

### 3.1. Prodrome

Natalie recounted experiencing confusion and anxiety in the days leading up to her hospital presentation, both of which she described as highly uncharacteristic. Normally very organised, she noted that the first sign she noticed of something being amiss was when she forgot her pram at a coffee shop, carried her baby home in her arms, and only realised

this hours later. She also recalled having difficulty following conversations, including with her paediatrician and friends:

*"She was just talking and it sounded so complex. I just didn't get it. And I'm like, 'Huh, why do I not get it?' Like usually I get that stuff. I was just kind of in this zone while she was talking at me and I just didn't really understand it. I can't really describe it. I have never had that problem before ... I remember sitting there thinking, 'Why do I struggle with this? This doesn't make sense. This is weird.'"*

Natalie also recounted being "obsessed" about her baby's weight despite regular breast feeding and otherwise bonding well. She said she thought the prompt for this was that her baby seemed slightly fussy about feeding over the first week and that she recalled a friend whose baby had difficulty gaining weight over several months with significant medical implications.

Natalie described a sense of unease. She said she recognised that something was wrong but was unable to identify what:

*"I was trying to figure out who was crazy. I thought it might be postnatal depression and I was trying to figure out who had postnatal depression – I did this quiz online and it didn't fit. So I made [my husband] do the quiz to see if he had postnatal depression and he didn't have it either."*

Natalie recalled speaking to her parents over the phone, who suggested that she seemed unlike her usual self. She also recalled becoming concerned about the impact of her confusion on her children, which prompted her to seek help:

*"I remember a day when I kind of lost it. I cried a bit and was confused about my language ... And he [my son] would just look at me like [he didn't understand]. And you know, those eyes – I thought I had to do something."*

### 3.2. Admission

On the night of presenting to hospital, Natalie reported that she started having racing thoughts, an experience that she had not had before, and feeling overwhelmed with these. She reported that these thoughts related to seemingly unconnected topics, including different people she knew:

*"I was just having so many thoughts. I was definitely aware of just my mind racing and not being able to shut it off. I went through a lot of things very, very quickly, all the time. I was just trying to always make sense of it ... I would go through everything I knew about this person, then everything I knew about this person."*

Natalie also described an ongoing sense of anxiety and restlessness, both of which were very atypical for her:

*"The scariest thing about it all was not knowing what was going on. Prior to this happening, I would suggest my strongest trait is*

*keeping cool under pressure ... Anxiety was very atypical for me.*

Natalie reported that her sense of confusion resolved very early in her admission. She still, however, noted a sense that she could not communicate clearly with staff and attributed this to the fact that her first language was not English. She recalled repeatedly seeking clarification from nursing staff about why she was in hospital, where her family was, and when she would recover.

### 3.2.1. First Fregoli delusion

Natalie recalled becoming convinced that another patient on her ward, an elderly woman, was her mother-in-law in disguise. Just prior to this, Natalie recalled receiving a text message from her mother-in-law on her phone, which she misinterpreted as threatening:

*"I remember looking at my phone and [my mother-in-law] had sent me a message – a typical message, but then it became proof briefly. It was kind of like, 'We will be looking after your two beautiful sons.' And it kind of sounded like, 'Once you're dead' ... I thought it was really heavy. Honestly, now when I look at it, it's just like a typical message, like every other message. But back then, I thought it looked like I was going to be dead for some reason."*

As a result, Natalie reported feeling fearful for her own safety. Natalie noted that her misidentification belief came on unexpectedly soon after this, when sitting next to the elderly female patient. Natalie said she initially noticed similarities in behaviour between the patient and her mother-in-law, which led her to conclude it was her mother-in-law:

*"It literally came very suddenly when I was sitting next to that lady. I know there were a few things. I remember she was going, 'Let's put on SBS [a television channel]' and I thought, 'That's my mother-in-law's favourite channel.' And she said something else and I'm like, 'Oh what a coincidence.' And then, really suddenly, she sat like this [demonstrates posture of sitting cross-legged]. I looked at it and I literally went boom, 'Oh my God, it's my mother-in-law!'"*

Natalie confirmed that it was the shared interests, mannerisms, and clothing – rather than any physical resemblance or feelings of familiarity – that provided the basis for her belief:

*"It was more her mannerisms and I thought the outfit looked the same. Her shoes and her pants were it for me. And the way she moved."*

Natalie noted significant physical differences between the patient and her mother-in-law. This included the fact that the patient was much older, more physically frail, had wispy hair, and was less well-groomed than her mother-in-law. Natalie said that she was not able to explain these physical differences but, despite these incongruities, was convinced that it was her mother-in-law.

Natalie reported testing whether the patient was her mother-in-law by asking the patient questions. In retrospect, though, she said she recognised that she asked leading questions that ended up confirming her belief:

*"I was pretty sure that it was her but wanted to make sure. So I tested her. I asked her leading questions. I asked her if she had a friend called 'Mary [name changed]'. She said 'yes' and that confirmed my suspicions. I asked her something about her friend and she's like, 'yeah'. And I took that as proof. Obviously in retrospect it sounds silly but it made complete sense at the time."*

Natalie rated her conviction in the belief that the elderly lady was her mother-in-law as 95% prior to asking questions and 100% after asking them:

*"I questioned initially, but once confirmed, it was confirmed. I did not think I was imagining it. She was very much there in person. I was super-convinced that it was her ... I was 100% sure that it was my mother-in-law. As much as [husband's name] was my husband that patient was [mother-in-law's name] ... I would very much call it a belief or a fact or whatever."*

She reported, however, not being able to explain how her mother-in-law had disguised herself and changed her physical appearance:

*"I can't really explain it as to how. I was just sure that that was my mother-in-law."*

Natalie reported becoming panicked as she feared that her mother-in-law would harm her:

*"I don't really know why, but I was suddenly really afraid of her. I thought she really wanted to harm me ... And I remember thinking that she's older, like physically, but it somehow still freaked me out ... I thought she was powerful enough to get here [the ward]. So clearly, physical appearance means nothing. Then I did think that she could do harm to me."*

Natalie said she tried to raise her concerns with staff but reported having difficulty doing so:

*"It's one of the only times where I'm not sure what reality was – if it actually happened or if it just happened in my head. I was trying to tell the nurses that this was my mother-in-law and, I swear, every time I spoke, she spoke over me ... So, I was kind of like, 'Ah ...', 'Th ...', 'Ba ...' So I couldn't speak, so basically she would stop me from revealing the truth. In hindsight, I'm like, 'Did she?' I can't imagine that she did ... But back then, I wasn't able to tell them and it made me freak out even more."*

Natalie reported also attempting to speak to staff in other languages so that the patient would not understand but found no staff who understood either.

Natalie recalled trying to repeatedly escape the ward and enter an area where a security camera was present, which she thought might offer more safety. As a result, however, Natalie

was transferred to a more secure adult mental health ward, which was larger and had a wide range of other patients.

### 3.2.2. Further Fregoli delusions

In the second ward, Natalie reported becoming convinced that another woman was her mother-in-law. She likewise described this second woman as physically different to her mother-in-law and that she reached her belief based on similar behaviours:

*"There was this one lady and she just talked at a phone all day, like the whole time. And she was only a room or two away from me, so I could hear her quite a bit ... Her talking just reminded me of [my mother-in-law]. I just thought it was her. Because you could just tell it was a very one-sided conversation."*

Natalie clarified that it was the patient's loud volume of speaking and the one-sidedness of the conversation that reminded her of her mother-in-law and again denied noticing any other similarities in their voices. Natalie also noted that the patient and her mother-in-law made similar gestures, including touching their chests when talking.

Natalie reported even more pronounced physical differences between this second patient and her mother-in-law. In particular, she noted this second patient was around 20 years younger than her mother-in-law and obese whereas her mother-in-law was slim:

*"There were zero similarities look-wise and clothing-wise and acting-wise. It was just the talking ... There was absolutely zero physical resemblance. It was just the way she spoke and what she spoke about – the one-way conversations. It just seemed so identical."*

She also denied any facial similarities:

*"It's almost the opposite. I focused on all the other stuff. When I looked at the face, I thought, 'Is that really her?' But it was definitely not the faces in both cases."*

Natalie noted how her belief fluctuated considerably for this second patient, increasing when she could hear the patient talking but decreasing when she physically saw her.

*"With the second one, I went in and out of being convinced the whole time. I wasn't quite as confident. It was more when I heard her ... When I didn't see her, I thought it was definitely [my mother-in-law]. And then when I looked into the room and saw her, I wasn't as sure."*

Natalie also reported not being as frightened by this second patient as the first, in part due to this fluctuation and the fact that this other patient seemed self-preoccupied.

Natalie recounted believing that a male patient in the second ward was her father-in-law. She noted that this male patient did not interact with the patient whom she thought was her mother-in-law but said she nevertheless assumed her father-in-law would be present too to accompany her mother-in-law:

*"He was just pacing around in the corridor. And for some reason, I felt like he was coming closer and that made me think it was [my father-in-law]. Because of his pacing around, I interpreted this as he knows that I have figured it out and he's getting nervous that I will tell the nurses. That's how I interpreted it and that's why I thought it was him."*

She noted that this male patient had grey hair and was tall like her father-in-law but was approximately 20 years younger than her father-in-law and had different facial features.

Natalie reported not being able to fully explain why these patients appeared different to her in-laws, but said she came to believe that time travel was involved. She said that this also explained why she encountered two different versions of her mother-in-law. She said, in retrospect, she thought a television show she watched influenced her thinking:

*"Sometimes I tried to draw parallels to movies. There's this Netflix series called 'Dark' ... From going through this cave, they could travel by 33 years forward or backward. That idea resonated with me somehow. I thought it was the same there ... So that person in [the first ward] was the same time difference back to the person in [the second ward], back to when I came. But I hadn't worked out if it was 33 years or 12 or whatever. So it was the same person but just at different ages."*

She reported being unsure if her husband could recognise his mother-in-law in the ward:

*"I just thought, because it was his mum, he can't see what I see. I didn't think about it much to be honest."*

Natalie also reported only communicating indirectly to her husband about her concerns about her mother-in-law. Natalie noted that her husband did not engage with her theories and tended to redirect conversations when she raised concerns:

*"I just said little things, like I don't really want [your parents] to look after our children on their own ... Maybe I knew deep down that would not be a good idea."*

She also noted that her husband stopped her talking to their eldest son after she asked her son questions that indicated her suspicion of her in-laws.

On reflection, Natalie said she thought that her concerns about her mother-in-law stemmed from the combination of longstanding difficulties communicating with her mother-in-law and the lack of support from her own parents, who were not able to visit from overseas due to COVID travel restrictions in place at the time:

*"Maybe it's just we're different characters and we just don't connect that well, but I just focused on that ... But the second part was the fact that I did not have any family support ... Knowing that was my only option was what I obsessed over. The relationship is not that challenging that I would have worried about it otherwise. I only had to worry about it because it was the only family or help I could get at that point."*

### 3.3. Broader conspiracy beliefs

Natalie revealed other beliefs she held at the time that supported her Fregoli delusions and that she had not previously revealed. She said that, soon after misidentifying the first patient as her mother-in-law, she came to believe that her in-laws were not her husband's real parents and had abducted him at birth. She said she thought that police were investigating this and had organised for her to be admitted to hospital for her protection and to avoid alerting her in-laws:

*"I just thought that they probably thought to keep me safe in there basically. I thought they put on this whole thing to keep me occupied in that place while they're figuring out what is happening outside of it. I thought that the police were after my in-laws. And I'm going to be kept here while the police get them ... not to give my parents-in-law the heads up that it's been figured out. And they're putting all those people around just to keep me busy."*

As part of this, she thought aspects of her admission were staged to prevent her from realising what was going on.

Natalie said that she soon came to believe that the other patients in the second ward were actors. She said that she believed this for most of her admission and rated her conviction as 100%. As evidence for this, she recalled thinking that many of the patients seemed to be unrealistic and overacting:

*"I thought everyone was an actor and it was all about me. I thought they were putting on a show ... It seemed so over the top. There was one lady who was ridiculously hyper. There was another lady who was very overweight and she always talked about her sister as being the favourite and all this random stuff. It just seemed staged. Like they were all characters from different shows."*

She noted also what she took to be makeup and costumes. She noted, for example, one patient missing an eye that she thought did not seem real:

*"I remember thinking that it was like a mask and wasn't particularly well done. I even looked at pretty closely going, 'Is this real?' But, for some reason, it looked like a costume to me. I just thought it was part of the act."*

Natalie recalled seeing a room in the ward that was run by a charity to provide second-hand clothing to patients, which she took as further evidence for her belief:

*"I thought that they were all wearing costumes ... There was this one room where you could actually dress up ... I saw there were before-and-after photos. I thought this was so that they all remembered to dress the same, so I wouldn't find clues as to that something wasn't right. It definitely fuelled my theory of it all being a massive act."*

In addition, Natalie recalled that, prior to admission, her husband had likened her erratic behaviour to a character in a popular television show. By coincidence, a patient in the

second ward had the name of another character from that show, which Natalie said she took as further evidence that the ward had been staged.

Natalie described similarly testing these other patients to see if they were actors:

*"I tried again to test them. I would ask them leading questions. I would ask their name and why they had come there. And because they were such different characters, I just thought it was too contrived and that they were actors putting on a show. It was like a game ... I would go to each one to test them, to ask them ... I thought it was one big show for me."*

Despite these concerns about actors, Natalie said she trusted the hospital staff throughout her admission. She said she thought that they were real, though thought they were aware of the broader conspiracy to keep her safe from her in-laws:

*"I overall thought everyone was there to help me ... Of course, I had moments of panic, but I never really got to distrusting staff. I always took whatever pills I was given without questioning it."*

Natalie reported that part of her distress at seeing her supposed mother-in-law stemmed from the belief that her mother had managed to get past the police's scheme to protect her.

Natalie reported not fully understanding what was happening and said she sought out clues in her environment that she thought might reveal special messages:

*"I thought that I was a genius. I thought that there were patterns and connections in everything and I was only one who could figure them out ... I was constantly trying to explain stuff and analyse stuff."*

Natalie likewise reported 100% conviction in this belief. She reported acting on this belief, actively seeking to find clues and messages:

*"Everything external I looked at – like magazines, TV, books – I always drew parallels. Like I always found something that was applicable and I didn't feel it was that much of a stretch ... I felt like it was speaking to me. I thought it was giving me messages ..."*

She reported, for example, staring at a board that reported which nurses were allocated to which patients and looking for patterns. She also reported looking at graffiti on the walls and reading magazines to look for messages:

*"I remember I looked outside in the courtyard, at the wall and all the stuff that was written there. I was trying to figure out if there were any clues that could help me. I was sitting in front of it for quite a while, just going through it all ... And I read these random gossip magazine and tried to find clues. I remember circling words."*

When reading magazines, Natalie noted finding similarities that related the article to her:

*"There was lot about the Royal family – Harry and Megan and the Queen ... It was talking about how they struggle and moving away from it to escape a toxic environment. I was like, I see parallels ... And then there was another article about Elle Macpherson and her sons ... I went cool, that could fit. I somehow made it all fit to be honest. I always found some commonality that I then focused on."*

Natalie reported believing that a particular patient, who had the same name as a spy handler in a television show, was aware of her situation and gave her clues:

*"I basically thought [this other patient] was there to help me figure it all out. I thought the others were actors, but I thought [this patient] was kind of like an undercover cop ... I was fishing for things to help me further. I always thought that he was giving me little cues to kind of solve the big puzzle. I really thought that."*

Natalie similarly reported being 100% convinced of this belief and said that she actively sought out this patient to obtain clues:

*"I was always asking him questions. I don't know what that guy thought I was doing. I was actively like trying to figure out what was going on. I was kind of half talking in code too. And he was just giving me these random responses. And I took them as clues."*

Natalie recalled, for example, a conversation about naming personal demons that she related to herself and her concerns about her mother-in-law.

### 3.4. Capgras delusion

As part of this ongoing conspiracy, Natalie reported questioning the motives of a friend who visited her in the ward. Contrary to her clinical team's impression at the time, Natalie denied thinking that her friend had been replaced by an impostor, only that her friend had sinister motives:

*"I thought she had an ill intent. I thought that she was no longer my friend ... I focused on anything that would give her bad intentions. I didn't trust her."*

Natalie recalled similar suspicions about others she knew:

*"I had this with a few people but [this friend] was the only one I saw in person. I just went through everything we have gone through and what she could possibly hold against me. And it suddenly all made sense that she must hate me ... I was not 100% convinced, but I just had moments where I was pretty sure that her intentions were not good."*

Natalie reported that the initial trigger for these particular concerns about her friend came from a clue offered by the patient whom she thought was revealing secrets to her:

*"I always thought that [this patient] was giving me little cues to kind of solve the big puzzle ... I remember him saying 'like cheese*

*and chalk'. I actually didn't truly understand it. But my interpretation was that it referred to someone different to me but somehow still very close ... So I went through my environment and I'm like, 'Who could I be cheese and chalk with?' I remember going, 'Am I cheese or am I chalk? And what does it mean?' ... So that's why I had [my friend] as one of them, where the two of us, as close as we've always been, are quite different in character."*

Natalie reported searching for incidents that could give grounds for her friend to be hostile. She reported testing her friend with questions and noticing that her friend appeared to be uncomfortable, which she took as evidence for her belief:

*"I tried to test if I can somehow get her to make a mistake and reveal that she's part of the whole thing ... I just asked questions to understand what she was up to ... I guess me being really weird kind of freaked her out a little bit, which then again was for me an indication that something isn't right. The more weird I was, the more she was like, 'Jesus. What is going on?' And with that, I took that as a sign that she wasn't quite honest."*

Natalie reported taking other cues from her environment as evidence. She reported, for example, seeing a memorial on hospital grounds that unsettled her when she was walking with her friend and that she took this as a message that something was not right with her friend. Natalie also reported a book that her friend gave her as gift triggered further suspicions as Natalie misinterpreted the plot as conveying a message of foreboding:

*"I even said to her ironically, 'Well, that's a great choice of books, thank you very much!'"*

### 3.5. Other delusions

Natalie recalled believing that she and her family were being pursued by paedophiles. She clarified that this concern was separate to her concerns about her parents:

*"I thought the ward was filled with paedophiles. I thought they were all there for paedophilia and after me ... I thought I was being followed by people in the ward ... And then I was actually freaking out because I was now like, 'Oh my God, they could figure out who I am and my kids could be exposed to this.' I got really worried."*

Natalie said she noticed she had been followed by several different male patients in the ward, which she took as evidence for her beliefs. She also reported longstanding concerns about paedophilia that had been made more salient prior to admission with a high-profile case overseas that caused widespread outrage due to the leniency of the sentencing. Natalie rated her conviction in this belief as 100% and being very worried and distressed by these concerns, though noted that they lasted for a short period during her admission.

Natalie reported entertaining other beliefs during her admission. She reported, for example, wondering if she was evil and a descendent of Hitler:

*“Somehow I thought that I was related to Hitler and that was why I was there [in the hospital]. I am Evil walking the Earth”*

Natalie noted a further influence of television on this belief:

*“That again was somewhat related to a movie. There is this show, it’s about this guy who is Lucifer, the Devil. He kind of walks the Earth. Anyway, that was where I got the idea from.”*

Natalie rated her conviction as 70%:

*“I was questioning it. I didn’t really believe it. But it just made sense to me at that time.”*

Natalie also reported entertaining the idea that she was dead:

*“I thought I had died and gone to the afterlife. I thought I had died in childbirth and that I was trapped in this place ... That one was just because I couldn’t make sense of anything happening anymore and then I was like, ‘Maybe?’”*

Natalie noted that she only considered the idea for a brief period of time – she estimated for a few minutes. She rated her conviction as 70% during this time and reported similarly questioning it:

*“I was more wondering like, ‘Is this it?’, ‘Am I?’, ‘Could it be?’ And then I thought that can’t possibly be it, but it’s the only reasonable explanation. Then I went, ‘No, it can’t be true.’”*

Natalie noted both the failure to find an explanation and the influence of past ideas contributed to this:

*“It was more that nothing else made sense. I also got that from something else I saw where a character was in the afterlife.”*

Natalie denied any beliefs involving passivity phenomena, thought manipulation, thought broadcasting, religious themes, or other forms of misidentification. She also denied believing she had special powers beyond seeing patterns or developing any beliefs around her husband and children beyond those involving her in-laws that she had already mentioned. As further screening during the follow-up period, Natalie completed the Peters et al. Delusion Inventory (Peters et al., 2004) and endorsed four items retrospectively for while she was symptomatic (people dropping hints with double meaning, ideas of reference, people not being what they seem, and feeling alienated from her thoughts) but denied any items for times prior to or after her admission. She likewise completed the Schizotypy Personality Questionnaire-Brief (Raine & Benishay, 1995) and endorsed one item retrospectively when symptomatic (ideas of reference) but denied any items for any other times.

### 3.6. Auditory hallucinations

Natalie was adamant that she had not experienced auditory hallucinations. When asked about the fact that staff

witnessed her talking aloud to herself, Natalie explained that this was driven instead by her belief at the time that she was being filmed:

*“I was convinced that they [staff] somehow could listen to me ... I always asked if I was being filmed or not and if there was a camera. They said no and I didn’t really believe them. I thought people were listening ... I just talked to the camera so that it could pick it up. I was just literally talking through my theories, so they could help figure it out with me.”*

### 3.7. Themes

Overall, Natalie described trying to make sense of her experiences throughout her admission:

*“If there is one overarching theme, it was me trying to make sense of my experience. I could tell something was not quite right and I would try to explain it and would come up with these different theories and crazy ideas. It was like a web – I would come up with one theory and absolutely believe that it was true. Then that would collapse and I would come up with another crazy theory and believe that.”*

Natalie also noted distortions in her thinking, such that she over-interpreted events and related them to herself with a negative bias:

*“I was so much in my own little world. It was very much all about me to some degree. I think all the theories I went through – honestly, like as crazy as they were – they all had some real starting point and I just blew them up ... Everything I thought about everybody all started with the things that I knew and I just had a really, I guess, negative spin to them, but I didn’t make them up ... I just blew them up in proportion.”*

In addition, Natalie identified, in retrospect, an influence of television and movies on the content of her delusions:

*“I actually don’t watch that much TV, but some of the ideas I got from movies and TV shows on Netflix. They were the foundations of some of my theories.”*

As already noted, this included the ideas that other patients were actors, that she had experienced time travel, that she might be Evil, and that she might be dead.

Natalie said that the sense of confusion she had prior to hospital resolved during her admission with the emergence of her delusional ideas. Natalie noticed, however, a pervading and uncharacteristic sense of anxiety throughout her experience. She reported that this was most pronounced in the lead up to hospital and that this reduced gradually over her admission. Natalie also reported racing thoughts throughout her psychosis:

*“I just had so many thoughts the whole time ... I don’t know how to describe this but it felt like my brain was very busy. It was a*

*racing. I was constantly jumping from one conclusion to another ... It was just an overwhelming amount of content to consume."*

Natalie denied noticing any distortions in her subjective sense of time or self. Natalie also denied experiencing depression, mania, or dissociative symptoms during her admission. Natalie completed the Dissociative Experiences Scale-II (Carlson & Putnam, 1993) both retrospectively for while symptomatic and at other times, though reported very low levels of dissociation (score 2/100) for all occasions.

Natalie reported thinking that her various beliefs would be obvious to others if she could communicate clearly but saw language as a barrier to being understood:

*"I thought – and this was a theme throughout – that people couldn't follow me because it was lost in translation ... that was my explanation for why people didn't get my theories, rather than them being just 'cray cray' [crazy] ... I thought a lot was lost in translation. And that was something that really worried me ..."*

Natalie described writing down some of her ideas for staff because of these concerns:

*"I also thought that if I scribbled some stuff down on letters and gave it to the nurses, it would all make perfect sense ... When I think back to what I wrote there, it probably made no sense to them ... To me, it all made sense and I thought it would have to make sense to them too."*

Natalie confirmed that she did not think others would find her ideas implausible:

*"I was so convinced of that theory that I didn't question the fact that other people would question it. I just felt that people didn't understand me."*

Natalie nevertheless reported sharing many of her beliefs only indirectly with staff:

*"I shared my beliefs about [my in-laws] but, a lot of it, I shared just through my random notes. Then I shared some of my theories in small ways, like saying to you [during admission], 'Hey, I'm not related to Hitler, right?' without explaining this further."*

Natalie reported withholding her beliefs towards the end of her admission:

*"I was trying to prove that I was good again, which obviously I wasn't, so I didn't really go into any of my theories too much."*

Natalie reported not sharing many of her beliefs with her husband because of his own considerable distress and from the pragmatic focus on their children. She also reported not considering others' perspectives on her beliefs:

*"I didn't really care too much what anyone thought to be honest. I was too much in my own little world to care. I didn't really think about what others thought."*

### 3.8. Resolution

Natalie reported that she had largely abandoned her theories towards the end of her admission. She reported increasing moments of insight:

*"Towards the end, I was aware that it was a problem with my mind and when I still just didn't feel that sharp. I was quite worried about not recovering from it."*

On a home visit while on leave from the ward, she recalled hearing pop songs in the car that she thought applied to her, one of her last experiences of frank psychosis:

*"It just felt like it could all apply to our relationship. It was just a statement of fact ... Neither positive or negative, just drawing parallels ... Relationships and trouble and love and first dates and everything."*

At the perinatal mental health unit, Natalie reported that her symptoms resolved completely:

*"I just had the anxiety. I still felt that I was being tested initially. The first week, everything I said or did, I thought I was being monitored ... I was really worried that they would take my kids away ... In the second week, that was when I became myself again."*

### 3.9. Adjustment to illness

Natalie reported initially focusing on recovery. She also reported not sharing her experiences with her husband or friends, both from a desire to move on and a sense that they could not relate to it, as well as the fact that her husband still found it upsetting.

On reflection, Natalie reported feeling very vulnerable from the experience. Natalie reported finding the general adult mental health ward to be particularly distressing given both the ward environment, where she found it difficult to speak to nursing staff, and the behaviour of other patients:

*"I just find it scary in hindsight ... Looking back at it, I'm like, 'Alright, that dude followed me around.' And that I find now scary that I was not aware of it or at least I didn't find it dangerous. I feel a massive sense of unease thinking about it now."*

Natalie reported struggling to understand why she was affected and not being able to find an explanation. Natalie acknowledged further feelings of vulnerability at the thought of not being able to rely on her own mind:

*"For a long time, I would go, 'Why did this happen?' ... I think the reason why it did bother me a lot is the fact that, of all things, it was my mind. It's so intangible for one ... Secondly, it's also always something that I was very proud of ... I obviously wasn't able to control that without medication. I felt [before] like I could control everything else to some degree. It was definitely distressing not having control."*

Despite these concerns, Natalie reported feeling relieved seeking help when she did and that she recovered quickly with treatment. As a result, she noted her psychosis was almost entirely confined to hospital, which limited its impact on her relationships and work.

When asked about what she found helpful in her treatment, Natalie reported finding the one-to-one nursing in the first ward helpful in terms of providing emotional support:

*"You could ask for help and have a chat. It helped with the reassurance, just getting used to the situation."*

Natalie reported reassurance from her treating psychiatrist was helpful:

*"One thing I found really helpful was [my treating psychiatrist] telling me I will be functioning again at some point. I was very focused on that."*

Natalie also said she found being given a diagnosis helpful:

*"There was comfort in that – knowing that there was a name for it and that it could be treated."*

She nevertheless reported having difficulty understanding the diagnosis when it was given to her, so thought having it explained to her earlier might have helped:

*"Looking back it, I remember I had to hear that I had postpartum psychosis three or four times before I got it ... When it all kicked off, I'm not sure if I would have been receptive, but I wish someone sat me down and explained that to me a bit more about what I had and what was happening ... that I might be have weird thoughts and all that."*

Natalie said she found it helpful to discuss her experiences in the follow-up period. She also acknowledged some concerns about a relapse:

*"The idea of relapse is still freaking scary. There's absolutely no way I would want to go back to [the general mental ward]. I would lock myself in a room and not go out."*

Natalie noted, however, feeling optimistic:

*"Overall, I'm kind of optimistic about not having a recurrence because recovery was very smooth, as far as I can tell. Once I was out of [the perinatal unit], I didn't have any anxiety anymore. Even with [a recent stressful situation], there was no point in time when I was stressed or worried. So that is why I am generally optimistic. So fingers crossed."*

A further follow-up visit after three years confirmed that Natalie remained well. Natalie provided written informed consent and approved the final version of this manuscript for publication. The case report was authorised by the local research ethics committee. As a single case report of a clinical patient, the study procedures and analyses were not pre-registered. Ethical requirements prevent sharing of raw data from the assessments, tests, scales, and investigations, which

were completed as part of Natalie's clinical care. Legal copyright restrictions prevent public archiving of the tests and scales administered, which can be obtained from the copyright holders in the cited references.

## 4. Discussion

Natalie's case provides a vivid account of delusions in postpartum psychosis. Given a full recovery, Natalie was able to describe her experiences in detail over time and clarify clinical features observed by the clinicians during her admission. Her account provides unique insights into Fregoli delusion and the other specific delusions she held. Her account also offers an important perspective on the general processes involved in delusions, highlighting, for example, the role of inference, the social and contextual influences on delusional content, and her own active involvement in assessing and discarding delusional hypotheses. Such insights have significant implications for cognitive theories.

### 4.1. Fregoli delusion

Natalie demonstrated Fregoli delusion by persistently misidentifying two female patients on the ward as her mother-in-law and a male patient as her father-in-law in disguise despite large physical differences (Langdon et al., 2014). Critically, Natalie identified similarities in interests and behaviour as the key driver underpinning her delusion. Natalie reported noticing similar mannerisms, interests, and speech patterns and testing these further with questioning, but denied noticing any facial resemblance or feelings of familiarity. Indeed, Natalie's misidentification of the second patient fluctuated depending on the available sensory cues, increasing with auditory cues and decreasing with visual ones. These features are consistent with accounts of Fregoli delusion in terms of hyperactivity of so-called person identity nodes – abstract representations of others' identities (Ellis & Young, 1990). The account is less easily explained by proposals based on simple facial similarity or a hypothesised increased autonomic responsiveness generating an inappropriate sense of familiarity (Ramachandran & Blakeslee, 1998).

In addition, Natalie's account highlights the role of mood, top-down expectations, and prior knowledge and memories on her beliefs. Natalie described a state of increased anxiety prior to the onset of her delusions, reflecting a more general state of paranoia. In this context, her strained relationship with her mother-in-law, combined with the fact that her own parents were unable to visit due to travel restrictions, appears to have been particularly salient. In keeping with paranoia, Natalie misinterpreted a message from her mother-in-law as threatening immediately prior to her delusions. She later also elaborated a detailed account of the admission being orchestrated to protect her from her in-laws after developing her Fregoli delusion. A further influence on the specific delusional content was that of television shows: While initially unable to explain her mother-in-law's disguise, an idea from a television show she watched provided the notion of time travel as a partial explanation for the physical transformation and the fact that she believed two different patients were her mother-in-law.

Altogether, the account suggests a primary role for paranoia in generating Fregoli delusion. Paranoia, which involves a sense of personal threat, could contribute to hypervigilance and the hyperactivity of person identity nodes of feared individuals. This, in turn, could result in misidentification when aspects of the activated representations match observed features of strangers. Consistent with this, persecutory features are common in other cases of Fregoli delusion (Teixeira-Dias et al., 2023). Not all cases, however, involve paranoia – some even involve positively-valenced emotions (Ellis, 1997; Ellis & Szulecka, 1996) – suggesting that other factors, including other emotional states and important attachment relationships, could contribute to hyperactivity of person identity nodes in other instances. In Natalie's case, the subsequent emergence of a more pronounced delusional atmosphere – representing a more diffuse sense of imminence and self-reference (Henriksen & Parnas, 2019) – suggests a further possibility, namely of aberrant salience (Kapur, 2003) as a contributing factor. Natalie, however, did not report this in relation to her Fregoli delusion and other cases have not involved this feature. Aberrant salience alone also has difficulty explaining the selective nature and emotional valence of misidentifications, though could still potentially contribute to hyperactivity of stored representations and misidentification.

#### 4.2. Other specific delusions

During admission, Natalie was suspected by staff of having Capgras delusion, reflected in her selective mistrust of a close friend that visited her. Assessment of this feature during her admission was limited by her confusion and thought disorder, the presence of other more prominent psychotic symptoms, the fact that her mistrust was limited to when her friend visited, and the relatively short period of time that she was symptomatic overall. Natalie was able to clarify afterwards, however, that she did not believe that her friend had been replaced, only that her friend had ill intentions. As such, she did not exhibit Capgras delusion. In a similar way, Natalie later clarified that times when she spoke aloud to herself, which staff interpreted as evidence of auditory hallucinations, were driven instead by a delusion that she was being filmed by hospital staff and her desire to share her thoughts with this audience. Such issues highlight practical challenges in assessing patients' symptoms and the potential unreliability of accounts that do not explore patients' beliefs and experiences in detail.

Natalie later reported temporarily entertaining the idea that she was dead and in the afterlife. Such ideas constitute Cotard delusion and Natalie did not disclose this to staff during the admission. Natalie recounted how this idea arose in the context of being unable to account for her experiences, with a further contribution from ideas from a television show. Natalie also described significant anxiety, referential phenomena, and ideas of the world being staged (Truman sign) around this time. Natalie, however, denied any dissociative symptoms and is unlikely to have encountered a temporary disruption of autonomic activity, both theorised to be involved in Cotard delusion. As such, Natalie account suggests the potential for delusional content to emerge through idiosyncratic hypotheses, rather than being solely determined by

specific sensory inputs. Natalie was nevertheless able to discard this belief as implausible, even whilst maintaining other delusions, indicating that belief evaluation is similarly unlikely to be a uniform process and instead likely to involve different thresholds of acceptability for different beliefs.

#### 4.3. Cognitive theories of delusions

Natalie's account reveals the complexity of processes involved in forming delusions. As already noted, her account indicates the significant role of prior expectations and contextual information – such as mood, prior relationships, and ideas from broadcast media – in shaping delusional content. As such, Natalie's account points to some degree of independence between the specific precursors of beliefs and delusional hypotheses, reflecting a critical role for the individual's inferences in producing delusional content. This inferential process was clearly apparent in Natalie's first-person account of her Fregoli and Cotard beliefs where she was able to identify specific triggers and the hypotheses she considered. The inferential process was also evident by the fact that Natalie's acceptance of Fregoli delusion led to elaboration of other delusional beliefs to support it, including the belief that police were protecting her from her in-laws, that other patients were actors in disguise, and that she had experienced time travel to explain the different versions of her mother-in-law. In addition, Natalie entertained multiple delusional beliefs simultaneously and sequentially. It is unlikely that Natalie experienced discrete sensory anomalies that could completely or reasonably account for each of these varied beliefs – anomalies that she was unconscious of and did not report – particularly within such a short time period.

This account thus emphasises the individual's active involvement in generating delusional hypotheses in a “top-down” manner and testing these by seeking further information, albeit in a largely confirmatory way. These processes appeared to be guided by the individual's pre-existing beliefs (including delusions once accepted), emotional state, and memories, including representations of past relationships, ideas in popular culture, and semantic knowledge. This is in keeping with the five stage framework of belief formation (Connors & Halligan, 2015, 2020). This framework holds that beliefs arise through stages of precursor, search for meaning, belief evaluation, belief, and the consequences of belief. It also notes the broad range of influences on individuals' beliefs and the self-perpetuating nature of beliefs, once formed, to shape appraisals and establish a broader web of belief.

The case stands at odds with theories of delusions that prioritise the role of anomalous sensory data in producing delusional content in an entirely “bottom-up” manner. The two-factor theory, for example, posited that individual delusions arise from the combination of a specific sensory anomaly and a global deficit in belief evaluation common to all delusions (Langdon & Coltheart, 2000). Later refinements, however, have implicated a greater role for inference, albeit still requiring specific sensory anomalies for individual beliefs (Coltheart et al., 2010; Langdon & Bayne, 2010). The current case supports these refinements and indicates the need for greater differentiation between precursor and inference in these theoretical models. In addition, this case helps to clarify

that delusional content can arise from precursors other than immediate anomalous sensory data, such as communication and broadcast media; that proposed deficits in belief evaluation are unlikely to be homogenous; and that delusions can impact subsequent inferences and belief formation.

Natalie's case has further implications for single case methodology. In particular, her account offers a rare opportunity to examine delusions close to their inception from both a first-person and third-person perspective without confounds usually present in established or ongoing psychosis. In Natalie's case, there were significant differences in what she revealed during her admission and after her recovery, as well as differences in terms of how specific symptoms were understood. As such, it highlights the risks of relying on single case studies without verifying that the delusions are mono-thematic and carefully exploring the surrounding phenomenology (Connors & Halligan, 2020), ideally also retrospectively after recovery. It likewise indicates potential dangers when characterising specific delusions in group studies, where it is not always possible to debrief the subject fully and clarify the nature of their experience from the patient's recovered perspective.

Of note, the primary value of case reports in this context is for testing theoretical models by identifying exceptions that need to be accounted for (David, 1993). They are not intended to establish aetiology or treatment effectiveness, which usually require larger samples and other research designs. As such, Natalie's case, while important in terms of identifying salient features that need to be explained in cognitive theories, need not be representative of all cases of Fregoli delusion or postpartum psychosis more generally.

#### 4.4. Postpartum psychosis

Natalie's rich first-person phenomenal account identifies features consistent with other descriptions of postpartum psychosis. This includes the prodromal aspects of confusion and anxiety leading to a kaleidoscopic unfolding of symptoms, including obsessive thoughts, disorganisation, paranoia, referential ideas, and delusions (Bergink et al., 2016; Kamperman et al., 2017; Klompenhouwer et al., 1995). She, however, did not experience significant mood disturbance, which is evident in most cases of postpartum psychosis, or hallucinations, which occur in a proportion (Kamperman et al., 2017). Fregoli delusion, while not typical, has been reported in previous cases (Lewis et al., 2023).

Interestingly, the apparent resolution of Natalie's subjective confusion in the prodrome with the emergence of delusions is in keeping with Conrad's proposed stages of psychosis, progressing across trema (undefinable discomfort), apophany (delusions as revelation), and anastrophe (increasing ideas of self-reference) (Mishara, 2010). Natalie nevertheless denied broader experiential changes, including dissociation, first rank symptoms, or other alterations in her sense of self or time that occur in other types of psychosis (Feyaerts, Kusters, et al., 2021; Ritunnano et al., 2022), such as schizophrenia, suggesting important differences. Natalie also clearly identified her delusions as beliefs in her retrospective account. She indeed explicitly noted that her experience of her Fregoli delusions was equivalent to that of ordinary,

strongly held but non-delusional beliefs and that she acted accordingly. This is consistent with a doxastic conception of delusions (Bortolotti, 2009) – that delusions can be understood as belief – and is contrary to alternative, non-doxastic conceptions that instead prioritise experiential changes and propose a discontinuity with ordinary belief, particularly in schizophrenia (Feyaerts, Kusters, et al., 2021). Natalie's account thus suggests some limits on the viability of this latter perspective in other conditions. Although not reported by Natalie, the broader experiential changes sometimes associated with delusions in schizophrenia can also be accounted for at a cognitive level within a five-stage framework of belief formation (Connors & Halligan, 2021a; 2021b).

Natalie's account further highlights the challenges in managing postpartum psychosis despite her relatively quick recovery. Natalie recounted being distressed from her time in the general psychiatric ward and reported a sense of alienation and vulnerability from her experiences. These responses are in keeping with themes reported by other women who have recovered from postpartum psychosis (Forde et al., 2020) and indicate the need for support after symptomatic recovery. More pragmatically, Natalie identified the importance of contact with staff, early diagnosis, and reassurance during her admission.

#### 4.5. Conclusions

Overall, Natalie's case has implications for understanding the cognitive genesis of delusions. The combination of Natalie's high premorbid intelligence, educational attainment, absence of any premorbid mental health concerns, specific set of symptoms, quick remission, and exceptional ability and willingness to recall and describe her experiences provides a rare opportunity to better characterise underlying cognitive processes. Such features can help inform models of psychosis and, in particular, delusions given the absence of confounds. Greater systematic study with other patients, however, is limited by the condition's rarity, frequent high levels of distress, safety concerns, relapse risks, and patients' understandable reticence to speak. Nevertheless, further study of postpartum psychosis, when possible, offers promise of greater insight into the specific mechanisms underpinning delusions.

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#### CRediT authorship contribution statement

**Michael H. Connors:** Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jessica Gibbs:** Writing – review & editing, Validation, Project administration, Data curation, Conceptualization. **Matthew M. Large:** Writing – review & editing, Validation, Supervision, Conceptualization. **Peter W. Halligan:**

Writing – review & editing, Supervision, Methodology, Conceptualization.

## Declaration of competing interest

We declare no competing interests.

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